

The commissioners, it seems, have not taken this part of the staff into account in drawing up their estimates of working expenses. The forest schools at present in existence in this country, with a little development, would be quite capable of undertaking the scientific training of this very essential part of the staff. For many years past the pressing need for demonstration areas and forest gardens has been urged upon the Government. Had these institutions been in existence now, their value would have been inestimable in indicating the soundest and most economic lines upon which extended afforestation should be carried out.

Coming now to the question of the acquisition of the necessary land, the commissioners recommend that compulsory powers be obtained by legislative enactment whereby proprietors would be forced to sell suitable land should private negotiations fall through. However, certain alternative schemes are proposed. For example, a scheme suggested by Lord Lovat of co-partnership between the private owner of land and the State, the owner to provide the land free of cost, the State to provide the capital necessary for its afforestation, the profits to be shared *pro rata* of their respective contributions, the owner to have the option at any time of buying out the State's interest. Again, it is suggested that the commissioners might be given power to afforest land acquired otherwise than by purchase by special arrangement with the owner, on such terms and conditions as may be approved by the Treasury, provided due security be taken for the continuity of the scheme. Still another plan is suggested, viz. that, if the owner of a surveyed area is prepared to afforest his land in a reasonable time under the supervision, and to the satisfaction, of the Forest Commissioners, compulsory powers of purchase should not be enforced against him. Finally, the commissioners suggest that the existing facilities given to landowners for obtaining loans for planting might perhaps with advantage be increased by extending the time for the repayment of the loan.

There are weighty reasons in favour of these alternative suggestions. In the first place, it would ensure the important cooperation and active assistance of landowners, many of whom are at present engaged in renewing and extending their forest areas, while many others would be willing to do the same should forestry become an established industry. The compulsory acquisition of the necessary areas would be bound to lead to a breaking-up of the existing arrangement of the land, especially as regards the larger sheep farms, and the consequent diminution of the food supplies, especially mutton, would possibly be greater than the 4·81 per cent. at present anticipated. By encouraging private owners to extend their forest areas, and by the gradual purchase of suitable land where available, the State would more slowly, but at the same time with greater certainty, attain the object which the commissioners have in view.<sup>1</sup> Legislative enactment might be directed towards the adjustment of the present railway rates, and the abolition of the tax on afforested areas.

In discussing the cost of plants and planting, the statement made at the top of p. 26, namely, that "if plants are purchased they will probably cost 4*l.* to 5*l.* per acre," does not seem to tally with the evidence, or what immediately follows in the next paragraph.

<sup>1</sup> It would also entail less initial expenditure. Under the present scheme it is proposed to raise the necessary capital by loan, the interest to be defrayed out of taxation. For the full scheme 2,000,000*l.* would be required annually. The net deficit in the first year would be 90,000*l.*, which would increase to 3,131,250*l.* in the fortieth year, after which it is calculated the forest would have become self-supporting.

DR. FRANCIS ELGAR, LL.D., F.R.S.

THE sudden death of Dr. Francis Elgar, F.R.S., at Monte Carlo, on January 16, has deprived the profession of naval architecture of one of its most eminent representatives, and the loss will be felt throughout the world of science, in which he had made many friends. He came of a family which had for generations been connected with the great naval arsenal at Portsmouth, and was himself apprenticed there about fifty years ago. For nearly seventy years the Admiralty has maintained an admirable system of schools for its apprentices, and has provided facilities by which those who prove capable of benefiting thereby shall receive higher instruction in those branches of mathematics which are used in connection with shipbuilding, as well as in the operations and processes incidental to practical work in drawing offices and mould lofts. Elgar was one of the young men whose progress in the school secured advancement to higher instruction. Fortunately for his career, just at the period (in 1864) when he had completed the preliminary stages of training at Portsmouth, it was decided by the Admiralty and Science and Art Department to join forces and to establish the Royal School of Naval Architecture and Marine Engineering at South Kensington. The Admiralty students at this school were selected by competitive examination in which apprentices in all the Royal dockyards took part. Elgar was one of eight young men chosen in this way from a very large number of candidates, and given an opportunity of passing through a three years' course of advanced study in the theory and practice of shipbuilding. This he did with distinction, and was awarded a first-class diploma of Fellow of the Royal School of Naval Architecture in 1867.

Sir Edward Reed—then chief constructor of the navy, and himself a graduate of an earlier school of naval architecture—took a warm interest in the welfare of the graduates from the new school, and appointed Elgar an assistant overseer of the ill-fated turret ship *Captain*, which was then building by Messrs. Laird, of Birkenhead. In the preparation of the design for that vessel, Captain Cowper Coles, R.N., had collaborated with Messrs. Laird, and Admiralty inspection was limited to supervising the work of construction. In this manner Elgar at an early age supplemented practical training obtained in Royal dockyards by close association with the business of a great private shipyard. About two years later he was recalled to Portsmouth, and received an appointment as a shipbuilding officer, being employed on important practical work in that establishment when the loss of the *Captain* took place. The master shipwright of the dockyard was asked to give evidence before the court martial in regard to the stability of the *Captain*. These conditions were altogether exceptional owing to the extremely low freeboard and heavy sail equipment of that vessel. In the preparation of this evidence, Elgar gave considerable assistance to his superior officer, and in this way began a series of investigations into the stability of ships which extended over many years, and covered mercantile vessels of various types, as well as warships.

In 1870 Sir Edward Reed resigned his position in the Admiralty, and established a private practice in London. Elgar became his chief professional assistant in 1871, and took charge of the London office, in which, during the next few years, novel and important designs for foreign warships and for mercantile vessels were prepared. In all these designs, as well as in the supervision of the work of building the ships, Elgar took an important part, and his services were acknowledged by Sir Edward Reed.

From 1874 to 1876 Dr. Elgar occupied an important position as general manager of Earle's Shipbuilding Company, at Hull; and from 1876 to 1879 practised in London as a consulting naval architect in conjunction with Sir Edward Reed.

A close connection with the Japanese Government, for whom Sir Edward Reed had designed several warships, led to the appointment of Elgar, in 1879, to be their special adviser upon naval construction. He proceeded to Japan, and remained there for about two years, dealing with important questions relating to dockyard organisation and shipbuilding programmes. This appointment indicated the high reputation Elgar had already achieved. On his return from this period of foreign residence, Elgar practised as a consulting naval architect in London, and continued to act in that capacity until 1886. For the most part his work was of a private character, but it included service as the confidential adviser of leading steamship companies, and was marked by public appearances in connection with special investigations into the causes of accidents to, or the loss of, important vessels. When the Orient liner *Austral* foundered in Sydney Harbour, Elgar investigated the matter, and demonstrated that the accident was due to a lack of proper precaution during the process of coaling the ship. When the *Daphne* capsized while being launched on the Clyde, Elgar exhaustively investigated the circumstances, and gave a rational explanation of the disaster. He also served as a member of the Special Committee appointed by the Board of Trade in 1883—with Sir Edward Reed as chairman—to propose rules for fixing the load-line of merchant vessels. The work done by this committee included the consideration of the strength and stability of many types of ships, furnished a settlement of a most difficult question, is still bearing fruit, and promises to lead to an international agreement.

During this period of his career, Elgar was appointed the first university professor of naval architecture in Great Britain. This chair was established at Glasgow (in 1883) by the munificence of Mrs. John Elder, and the selection of Elgar to fill it gave universal satisfaction, and afforded fresh evidence of his high professional reputation. The inaugural address which he delivered at the commencement of his work not merely attracted a large and representative audience, but was in itself a most excellent performance. The period during which Elgar served as a teacher of naval architecture was comparatively brief, for early in 1886 the Admiralty created the new post of director of dockyards, and sought out a man to fill it who should combine experience in private yards with an intimate knowledge of warship-building. Elgar was selected, and accepted the great responsibility of making proposals for reorganisation of the dockyards and giving practical effect thereto, with the view of increased economy and rapidity in the work of construction and repair of the ships of the Royal Navy. This was no light task; it was well performed, and voluntarily terminated in 1892, when Elgar accepted an invitation to become a director and consulting naval architect to the Fairfield Shipbuilding and Engineering Company, of Glasgow. This business had been first established by John Elder and others, had been greatly developed by Sir William Pearce, and after his death was in need of a capable and thoroughly trained professional head. The connection which thus began was terminated by his own choice about two years ago, with the intention to obtain and enjoy a well-earned leisure. From this retirement, however, he soon emerged in order to undertake the chairmanship of the great industrial enterprises belonging to Cammell, Laird and Co., including steel works, armour-plate factories, shipbuilding and

marine engineering departments, and mining operations. Immediately after accepting this position it was associated with that of chairman of the Fairfield Shipbuilding Company. When Elgar assumed these responsibilities, a radical reorganisation had to be undertaken in the establishments and staffs of Cammell, Laird and Co. In carrying out this heavy and delicate task, Elgar gave remarkable proofs of ability and energy, and necessarily made demands upon his strength which may have tended to bring about the unexpected and sudden death so widely mourned. He had taken a holiday on the Riviera at the close of the year; a slight accident occurred, but there was no thought of consequent danger, and the end came suddenly.

Elgar united practical experience with a wide knowledge of science and strong literary tastes. His papers on professional subjects—most of which are published in the Transactions of the Royal Society, and in those of the Institution of Naval Architects—furnish illustrations of these qualities, and contain much original work. About two years ago Elgar undertook the delivery of the Forrest lecture at the Institution of Civil Engineers, and dealt with "Unsolved Problems in Naval Architecture" in a manner which excited admiration amongst those familiar with ship design, while it proved interesting to engineers generally. He was elected F.R.S. in 1895, and some years previously had become F.R.S.E. The University of Glasgow gave him the honorary degree of LL.D. in 1885. His closest connection was naturally with the Institution of Naval Architects, on the council of which he had served for twenty-five years, and of which he was treasurer and honorary vice-president at the time of his death. He was a member of council of both the Institution of Civil Engineers and the Royal Society of Arts, in the affairs of which he took an active interest. He was also a member of many engineering and scientific societies at home and abroad. The council of the Institution of Naval Architects chose him to act as their representative on the governing body of the Imperial College of Science and Technology, on the committee of the National Physical Laboratory, and on the Advisory Committee on Shipping established recently by the Board of Trade.

Elgar did good work in connection with the British commissions for international exhibitions at Chicago, Paris, and elsewhere, and his services were recognised by his appointment as Chevalier of the Legion of Honour. His last work in this department was done for the Franco-British Exhibition, where he served as chairman of the shipbuilding section, and organised one of the most remarkable collections of ship-models ever brought together. Busily engaged as he always was, Elgar had little opportunity for extensive literary work. In 1873 he produced an interesting and beautifully illustrated book on "The Ships of the Navy," and in various papers—some of which were contributed to the "Sette of Odd Volumes"—he displayed an intimate knowledge of the earlier history of shipbuilding. He was intimately concerned also with the production of the review, *Naval Science*, founded by Sir Edward Reed in 1872, and continued until 1875. Elgar was a man whose interests were wide and varied; his personal qualities secured for him a multitude of friends who mourn his loss; but, above all, he will be remembered as a brilliant example of the modern naval architect in whose work were embodied the results of thorough training in both the science and practice of his profession, which training was supplemented by ripe and varied experience, and bore fruit in original investigation, the solution of novel and difficult problems, and valuable contributions to the development of a great British industry.

W. H. WHITE.